AMENDMENTS TO THE CLAIMS

Claims 1-10. (Cancelled)

11. (New) A method for detecting the presence of target analytes, the method comprising:

providing an electrode comprising a self-assembled monolayer and an assay complex covalently attached to the electrode, the assay complex comprising a target analyte, a capture binding ligand and an electron transfer moiety;

applying an input waveform to the electrode, the input waveform illiciting a response of characteristic waveform from the electrode indicative of electron transfer between the electron transfer moiety and the electrode;

receiving an output waveform from the electrode, responsive to the input waveform;

analyzing the output waveform for the presence of the characteristic waveform.

12. (New) A method according to claim 11, wherein the act of analyzing the output waveform includes utilizing chronocoulometry.

13. (New) A method according to claim 11, wherein the act of analyzing the output waveform for presence of the characteristic waveform includes applying the output waveform to a digital lock-in amplifier.

14. (New) A method according to claim 11, wherein the act of analyzing the output waveform for presence of the characteristic waveform includes fitting the output waveform to the characteristic waveform.

15. (New) A method according to claim 14, wherein the act of fitting the output waveform to the characteristic waveform includes calculating an error between the characteristic waveform and the output waveform.

16. (New) A method according to claim 11, wherein the act of analyzing the output waveform for presence of the characteristic waveform includes determining a background signal and subtracting the background signal from the output waveform.

17. (New) A method according to claim 11 wherein the electron transfer moiety comprises a transition metal complex.

18. (New) A method according to claim 11 wherein the target analyte comprises a nucleic acid.

19. (New) A method according to claim 11 wherein the target analyte comprises a protein.

20. (New) A method according to claim 11 wherein the input waveform comprises at least a portion having a frequency of about 100 kHz.

21. (New) A method according to claim 11 wherein the input waveform is a voltage waveform and the output waveform is a current waveform.

22. (New) A method according to claim 11 wherein the characteristic waveform comprises a Gaussian waveform.

23. (New) A method according to claim 11 wherein the characteristic waveform comprises a modified Gaussian waveform.

24. (New) A method according to claim 11 further comprising:
predicting the characteristic waveform, based at least on the electron transfer moiety.

25. (New) A method for detecting the presence of target analytes, the method comprising:

providing an electrode comprising a self-assembled monolayer and an assay complex covalently attached to the electrode, the assay complex comprising a target analyte, a capture binding ligand and an electron transfer moiety;

applying an input waveform to the electrode;

receiving an output waveform from the electrode, responsive to the input waveform;

analyzing the output waveform using chronocoulometry to identify electron transfer between the electron transfer moiety and the electrode.